

DATE PREPARED: <b>June 13, 2007</b> <b>Revision A: 01/21/09</b>	<b>ISS PAYLOAD OFFICE</b> <b>PIRN/EXCEPTION FORM</b>	<b>PAGE 1 OF 4</b>				
Doc. No., <b>SSP 57213, Initial Release</b> Rev. & Title: <b>Alpha Magnetic Spectrometer (AMS) Interface Control Document</b>		PIRN No:  <b>57213-NA-0009A</b>				
TITLE:  <b>AMS (Alpha Magnetic Spectrometer) – External Touch Temperature – Unlimited and Incidental Contact Exceedance</b>						
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<b>Utilization Change Engineer:</b> Name: <b>Jeff Dadd</b> Agency: <b>Boeing PEI</b> Phone: <b>281-226-4220</b> Email: <b>Jeffery.S.Dadd@boeing.com</b>	SSCN/CR <b>N/A</b>	RELATED PIRN No.: <b>N/A</b>				
Agency Tracking No.: <b>57213-0006</b>	SYSTEM/ELEMENT AFFECTED & STAGE EFFECTIVITY: <b>AMS – Launch through End Of Life</b>					
REASON FOR CHANGE OR REQUIREMENT(S) VIOLATION: <b>AMS exceeds External Touch temperature requirement defined in SSP-57003, Paragraphs 3.11.5.14.</b>  <b><u>Revision A: Incorporated NCR Number NCR-ISS-AMS-001 on pg. 3.</u></b>						
PARAGRAPHS, FIGURES, TABLES AFFECTED (For PIRN use only)						
<u>Page</u>	<u>Paragraph(s)</u>	<u>Figures(s)</u>	<u>Table(s)</u>	<u>R</u>	<u>A</u>	<u>D</u>
3-144	3.11.5.14.1	N/A	N/A			
3-145	3.11.5.14.2	N/A	N/A			
AFFECTED INTERFACING PARTIES						
	SIGNATURE & ORGANIZATION	DATE	SIGNATURE & ORGANIZATION	DATE	SIGNATURE & ORGANIZATION	DATE
C O N C U R	/s/ Dave Hornyak/ OZ3	02/18/09	/s/ Chris Schmitt/ Boeing EVA	01/21/09		
	/s/ Gene Cook/ OZ3	02/18/09	/s/ Lori Crocker/ NASA EVA /NCR-ISS-AMS-001	02/10/09		
	/s/ Vic Sanders/ Boeing PEI	02/12/09	/s/ Rod Jones/ PCB	02/19/09		
	/s/ Sharm Baker/ S&MA	02/09/09				
	/s/ Trent Martin/ AMS	02/02/09				
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**SSP 57003 Requirements:**

**Requirement Number:** 3.11.5.14.1  
**Requirement Title:** INCIDENTAL CONTACT

For incidental contact, temperatures shall be maintained within −180 to +235 degrees Fahrenheit,  
or limit heat transfer rates as listed in Table 3.11.5.14.1–1. [per SSP 41162, paragraph 3.3.6.12.2.1]

**Requirement Number:** 3.11.5.14.2  
**Requirement Title:** UNLIMITED CONTACT

For unlimited contact, temperatures shall be maintained within −45 to +145 degrees F, or for designated EVA crew interfaces listed in Table 3.11.5.14.2–1, limit heat transfer rates as listed in  
Table 3.11.5.14.1–1. [per SSP 41162, paragraph 3.3.6.12.2.2]

**Proposed AMS Payload Exceptions:**

**Requirement Number:** 3.11.5.14.1  
**Requirement Title:** INCIDENTAL CONTACT

For incidental contact, temperatures shall be maintained within −180 to +235 degrees Fahrenheit,  
or limit heat transfer rates as listed in Table 3.11.5.14.1–1. [per SSP 41162, paragraph 3.3.6.12.2.1] **The AMS payload exceeds the requirement in three areas, but has shown adequate justification for exception based on requirements defined in JSC 28918.**

**Requirement Number:** 3.11.5.14.2  
**Requirement Title:** UNLIMITED CONTACT

For unlimited contact, temperatures shall be maintained within −45 to +145 degrees F, or for designated EVA crew interfaces listed in Table 3.11.5.14.2–1, limit heat transfer rates as listed in  
Table 3.11.5.14.1–1. [per SSP 41162, paragraph 3.3.6.12.2.2] **The AMS payload exceeds the requirement in three areas, but has shown adequate justification for exception based on analysis.**

**Rationale:**

ESCG-4470-07-TEAN-DOC-0033B (Document attached) provides the results of the AMS payload evaluation of all contingency EVA hardware. The AMS payload exceeds the requirement in three areas: EVA Connector Panel and Flight Releasable Grapple Fixture (FRGF) for Unlimited Contact, and Debris shield for Incidental Contact, but has shown adequate justification for exception based on analysis. The conclusion section of this memo states:

“A touch temperature thermal evaluation of the AMS-02 was performed. EVA interfaces that were evaluated include the handrails, grapple fixtures, the EVA connector panel, and the ROEU. The results of this analysis showed that all the components passed touch temperature requirements as stated in SSP 57003 [1] with the exception of the EVA connector panel and the FRGF. Further analysis as described in References [2] and [3] result in an allowable high pressure and 1 PSI grasp times of 4.00 and 9.50 minutes respectively for the EVA connector panel. Similarly, the allowable high pressure and 1 PSI grasp times are 2.00 and 3.25 minutes respectively for the FRGF. The investigation to determine if any of the external portions of the hardware that can be touched or bumped during EVA operations exceeds the incidental contact limits revealed that the debris shield, reached a minimum temperature of -183°F. This temperature is outside the minimum incidental contact temperature stated in SSP 57003 [1] but is within the acceptable limits of those stated in JSC 28918 [2]. It is recommended that based on these results, a waiver be processed for these items.”

The AMS payload exceeds the requirement in three areas but has shown adequate justification for exception based on analysis.

### **PEI Analysis:**

PEI concurs with the justification for exception based on ESCG-4470-07-TEAN-DOC-0033B analysis, which was performed considering the entire range of solar Beta angles (-75 to +75°) as well as the range of possible ISS attitudes. Boeing EVA safety recommended presenting a Noncompliance Report (NCR) to the EVA Analysis and Integration Team (EVA-AIT), and to the Payload Safety Review Panel (PSRP). The rationale for acceptance included in the NCR states that analysis of the EVA connector panel shows a high pressure grasp time of 4 minutes and a 1-psi grasp time of 9.55 minutes. This should be ample time to perform the contingency EVA of swapping connectors. The connector panel does not need to be touched or held continuously during this operation. Similarly, the FRGF shows high pressure grasp time of 2 minutes and 1-psi grasp time of 3.25 minutes. This should also be sufficient for the FRGF contingency EVA.

The EVA-AIT approved the NCR Number: NCR-ISS-AMS-001 on 08/07/8 (Document attached).

Per PSRP request, the following clarification was included in the NCR on 12/09/08:

APPLICABLE REQUIREMENT: NSTS 1700.7B ISS Addendum  
217 Extravehicular Activity (EVA)

200.3 Environmental Compatibility. (See Note Below)

NOTE: Reference below for specific EVA contact temperature values consistent with NSTS 07700 Volume XIV, Appendix 7 and SSP 57003

The PSRP approved the NCR Number: AMS-02-NCR-001 on 01/06/09 with the above clarification included (Document attached).

Rationale for PSRP's clarification: the NCR must reference the section of NSTS 1700.7 that is applicable, these are two sections: the first (217) relates to the specific hazard of touch temperatures for an EVA crewmember, the second (200.3) provides a reference back to the ICD where the temperatures are levied on AMS. The note is so that the excerpts from the ICDs are able to be placed on the form as the PSRP is only addressing the NCR to the 1700.7B ISS Addendum requirements.

**PEI Recommendation:**

Approve as written.

**Operational Constraints: (As Needed)**

None identified by PEI.

**PTR Recommendation:**

Approve as written.

**PCB Disposition:**

Approve as written.